United States Patent [19]

Jarman

[11] **3,796,084**

[45] **Mar. 12, 1974**

[54] **VEHICLE STRAIGHTENING DEVICE**

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[21] Appl. No.: **256,560**

[52] **U.S. Cl.** **72/447,** 72/705

[51] **Int. Cl.** **B21d 1/12**

[58] **Field of Search** 72/444, 447, 446, 305, 72/705; 254/1, 2

[56] **References Cited**

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Attorney, Agent, or Firm—Clarence A. O'Brien; Harvey B. Jacobson

[57] **ABSTRACT**

A vehicle straightening device comprising a pull tower including a stationary support column, a horizontal pull frame reciprocally mounted to the support column for movement relative thereto between extended and retracted positions, movable locking means associated with the pull frame for grasping and pulling a chain or the like during retraction of the frame, and stationary locking means for grasping the chain and maintaining tension thereon during return of the pull frame to its extended position.

16 Claims, 9 Drawing Figures

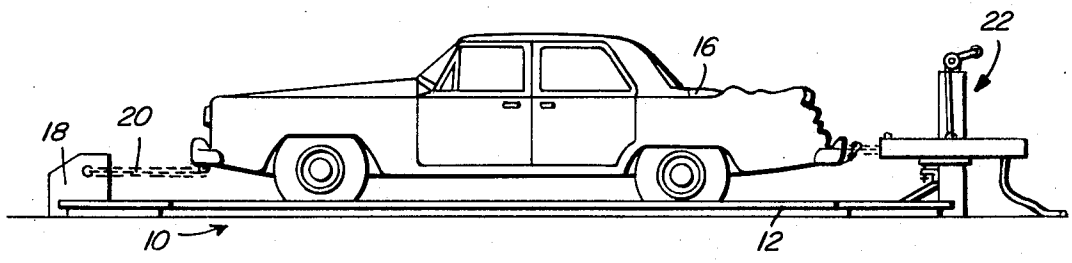


Fig. 1

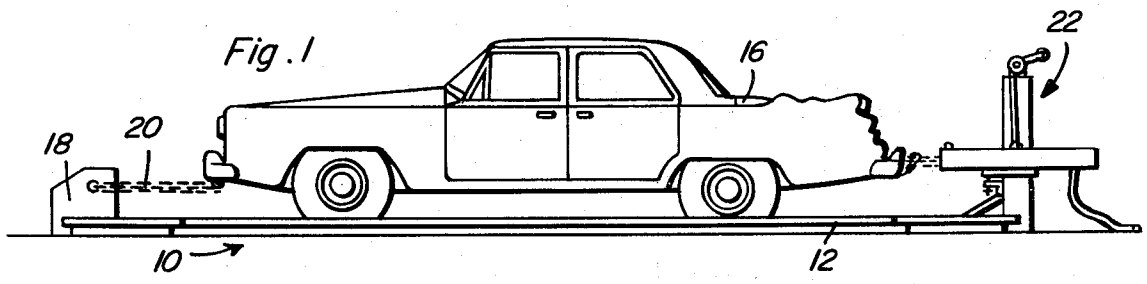


Fig. 5

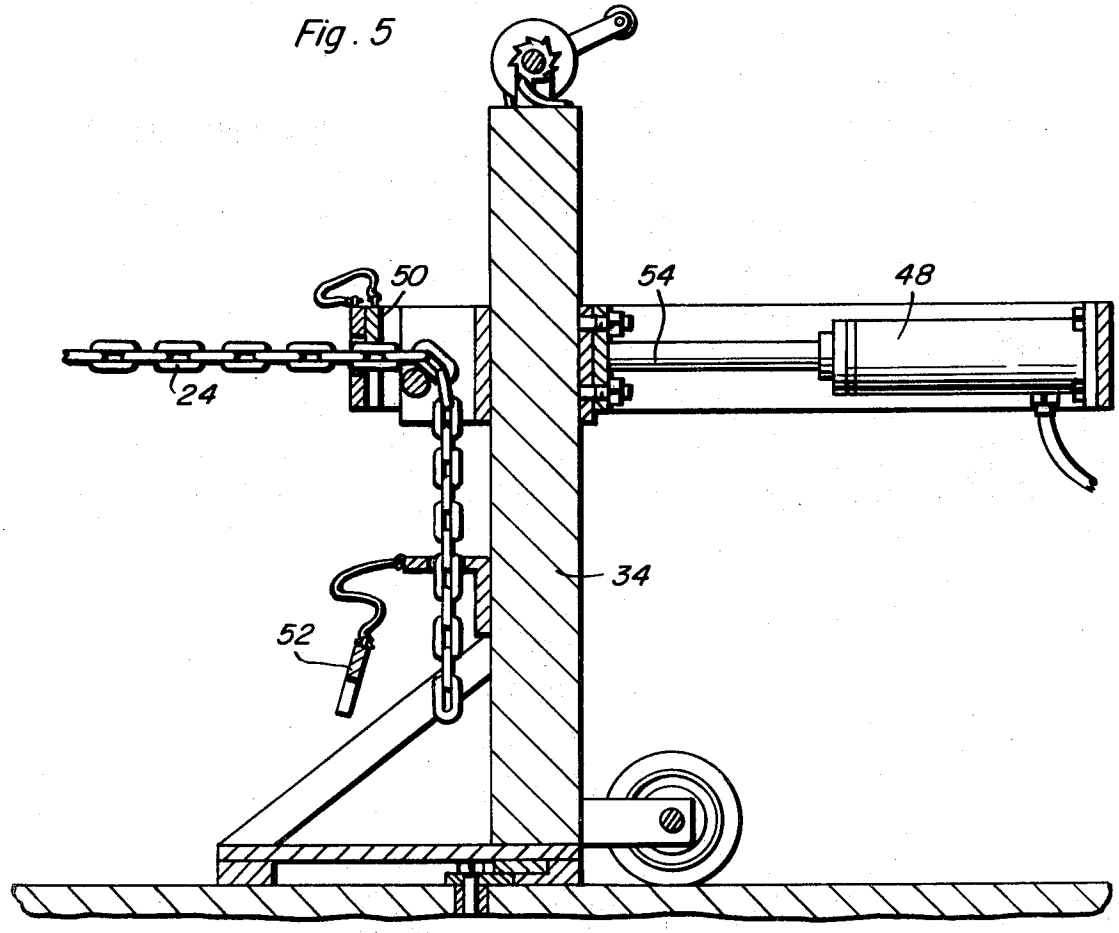


Fig. 8

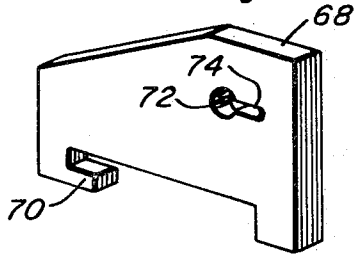


Fig. 9

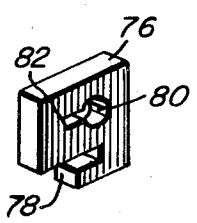


Fig. 2

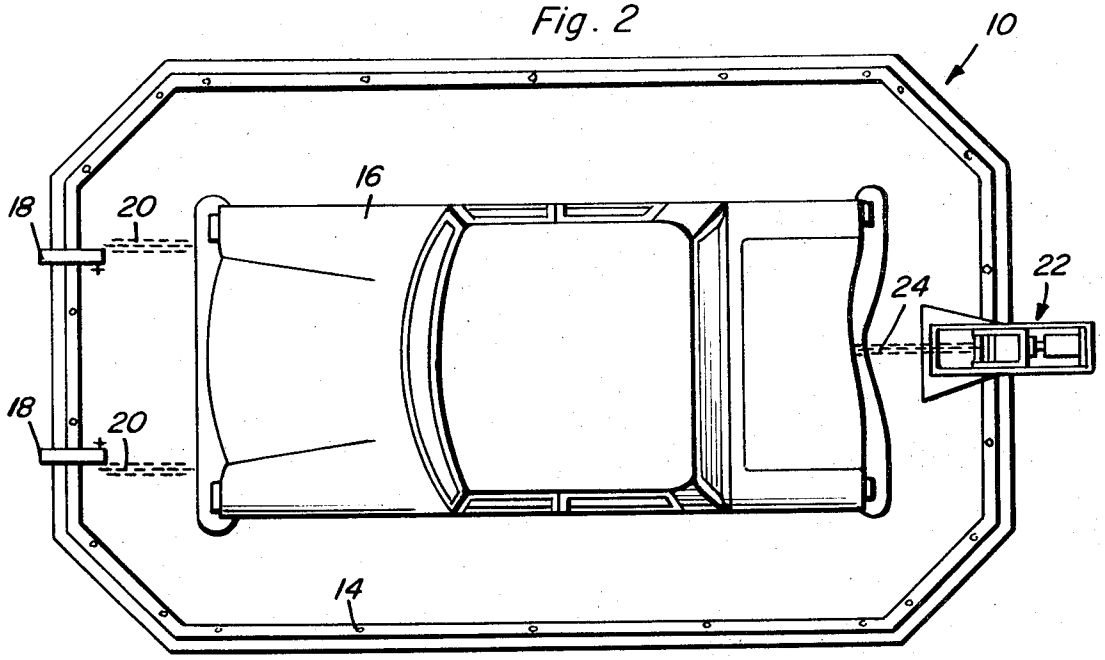


Fig. 6

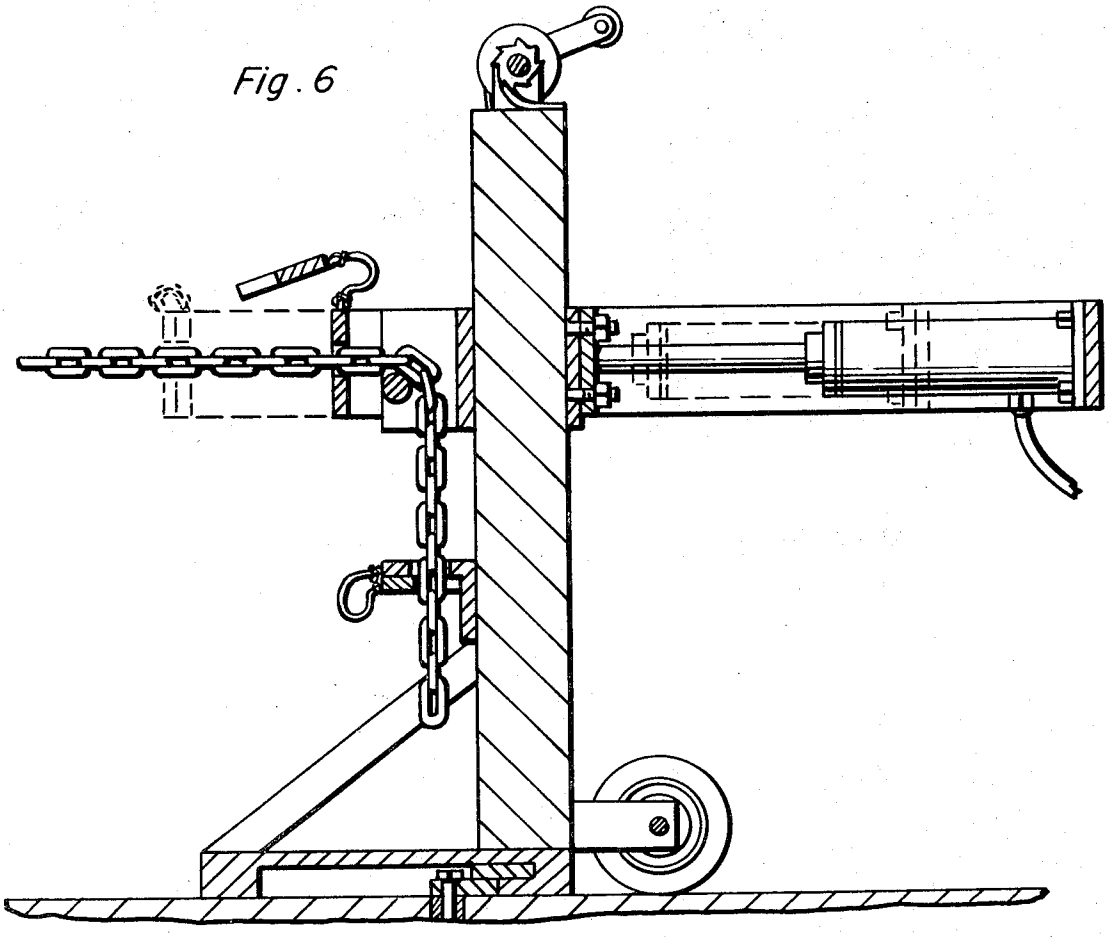


Fig. 3

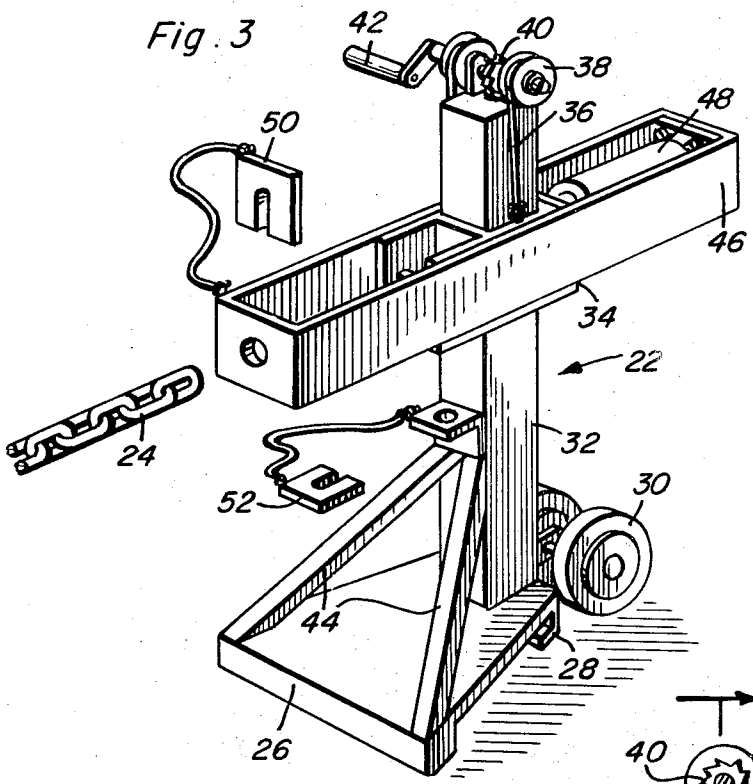


Fig. 7

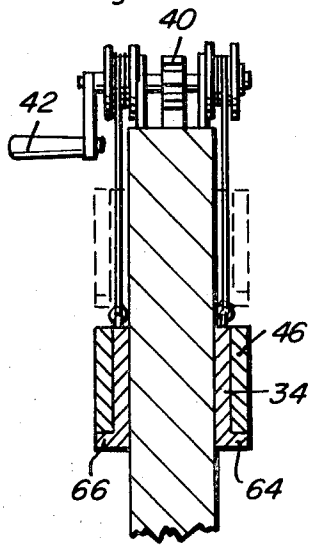
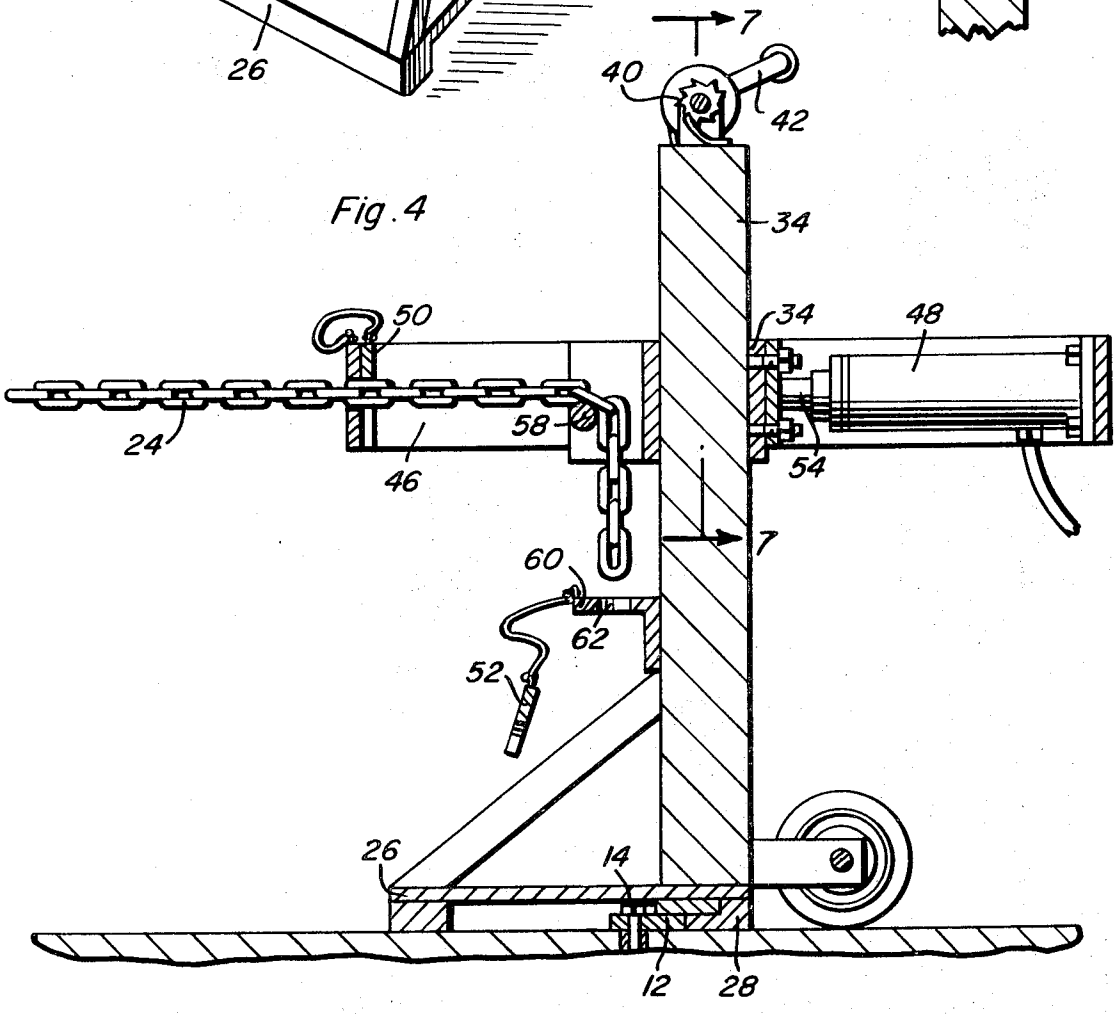


Fig. 4



VEHICLE STRAIGHTENING DEVICE

The present invention is generally related to metal deforming devices and, more particularly, to an improved vehicle body and frame straightening assembly.

In recent years, there has been a large increase in the number of vehicles on the highways, with a corresponding increase in the number of vehicle damaging accidents. Many such accidents result in serious vehicle body and frame damage, which heretofore had been extremely expensive to repair. Various frame straightening devices have been provided for making such repairs. However, these conventional constructions have been costly to manufacture and install and/or have proven to be time consuming, and often uneconomical, to operate.

Therefore, it is an object of the present invention to provide a novel vehicle straightening assembly which is relatively economical to manufacture and install and which may be expeditiously operated with a minimum amount of effort.

Another object of the present invntion is to provide a unique vehicle straightening assembly which includes means for maintaining tension on a pull chain, or the like at all times, whereby the resiliency of the vehicle body and frame is overcome to prevent partial return to the damaged configuration throughout the straightening operation.

It is a further object of the present invention to provide a versatile pull tower or device which includes a reciprocal pull frame together with movable and stationary locking means for grasping a pull chain, cable, or the like, whereby tension may be maintained on the chain during both the pull and return reciprocal movements of the pull frame.

It is still another object of the present invention to provide a unique pull tower or device for vehicle straightening including a horizontal, reciprocal pull frame which is slidably supported by a vertical support column by way of a mounting collar, whereby the elevation of the pull frame may be selectively adjusted to the desired height by raising or lowering the mounting collar.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

FIG. **1** is an elevational view of the vehicle straightening assembly of the present invention connected to a typical damaged vehicle.

FIG. **2** is a plan view of the vehicle straightening assembly and vehicle illustrated in FIG. **1.**

FIG. **3** is a perspective view of the pull tower associated with the present invention with a typical chain and locking means illustrated in disassembled condition.

FIG. **4** is a sectional view of the pull tower illustrated in FIG. **3** with the pull frame in a fully extended position and the movable locking means engaging the pull chain.

FIG. **5** is a sectional view of the pull tower similar to FIG. **4** but with the pull frame in a fully retracted position.

FIG. **6** is a sectional view of the pull tower similar to FIG. **5,** but with the movable locking means disengaged from the chain and with a phantom view of the pull tower returned to the fully extended position.

FIG. **7** is a sectional view taken along section **7—7** of FIG. **4.**

FIG. **8** is a perspective view of one embodiment of a chain anchor associated with the present invention.

FIG. **9** is a perspective view of a second embodiment of a chain anchor associated with the present invention.

Referring now, more particularly, to FIGS. **1** and **2** of the drawings, the vehicle straightening assembly of the present invention is generally indicated by the numeral **10** and includes a rigid anchor track **12** fastened to a concrete floor or the like by way of a plurality of bolts **14,** or similar fastening means. Preferably, the anchor track is of sufficient size and configuration to surround the perimeter of a vehicle such as that indicated at **16.** The assembly is provided with a plurality of stationary anchor members **18** which are removably fastened to the anchor track at selected positions to accommodate stationary anchor chains **20** which are fastened to the vehicle body or frame by hooks, or other appropriate means.

A pull tower or device, generally indicated by the numeral **22,** is appropriately fastened to the anchor track at a location oppositely disposed of the stationary anchors **18.** The pull tower is provided with a movable chain or the like **24** which is fastened to the vehicle by appropriate means, whereby pulling on the chain is effective to deform the metal body and/or frame of the vehicle toward its original configuration. It will be appreciated that since the anchor track surrounds the entire vehicle, the stationary anchors and pull tower may be selectively positioned at any desired locations to effect the required pulling on the damaged body or frame. It should be noted that it is not intended that the present invention be limited to the use of chains for the straightening operation, and that other conventional elongated, generally flexible members, such as cables, may be likewise utilized with appropriate modifications to the stationary anchors and pull tower. Once the anchor and pull chains have been fastened to the vehicle, actuation of the pull tower is effective to impart tension forces on the vehicle frame or body which tend to return it to its original configuration.

With reference to FIG. **3** of the drawings, it will be observed that the pull tower of the present invention includes a stationary, rigid support framework comprising a base **26** with a mounting flange **28** and a pair of rotatably mounted wheels **30.** The support framework further includes a vertical support column **32,** preferably welded to base **26** and slidably carrying a mounting collar **34** which is vertically adjustable by way of a pair of support cables **36** which extend around reels **38,** operatively connected to a conventional ratchet mechanism **40** and crank handle **42.** Preferably, a pair of support legs **44** extend upwardly from base **26** to a medial portion of support column **32** for reinforcement thereof. An elongated, horizontal pull frame **46,** of steel or similar materials is slidably carried by mounting collar **34,** such that it is reciprocally movable with respect to the vertical support column.

A hydraulic cylinder or ram **48** is mounted between one end of pull frame **46** and mounting collar **34** in order to effect horizontal movement of the pull frame.

As the pull frame is retracted, such movement is transferred to the pull chain **24** by way of a movable locking means **50** associated with the pull frame. In addition, the stationary support framework is provided with a stationary locking means **52** which coacts with the pull chain to maintain tension thereon, as hereinafter explained.

Referring now, more particularly, to FIGS. **4–6**, the operation of the pull tower associated with the present invention may be more fully understood. Pull frame **46** is slidably mounted on collar **34** for reciprocation between a fully extended position, illustrated in FIG. **4**, and a fully retracted position, illustrated in FIG. **5**. As mentioned above, this is achieved by way of a hydraulic ram **48**, of a conventional type, including an elongated piston arm or rod **54** fastened to the mounting collar **34**. The hydraulic ram is actuated by conventional means, not illustrated, whereby movement of the pull frame may be controlled at all times. Initially, the pull tower is set up as illustrated in FIG. **4** with chain **24** extending through an aperture **56** in the end of the pull frame facing the vehicle. The chain is locked in position by way of movable locking member **50** which is provided with an opened slot of appropriate dimension which embraces one of the chain links. The pull chain extends from the movable locking member over a guide rod **58** associated with the mounting collar **34** and extends downwardly toward stationary locking member **52** and a rigid flange **60** mounted to vertical support column **34** and provided with an appropriate chain-receiving aperture **62** formed therein.

As hydraulic ram **48** is actuated, chain **34** is pulled toward the right deforming the vehicle body or frame toward its original configuration. The pull frame reaches its end of travel at the fully retracted position illustrated in FIG. **5**. In this position, a considerable length of the pull chain extends through the chain receiving aperture **62** of flange **60**. Prior to reversing the hydraulic ram, the stationary locking member **52** is placed in retentive engagement with the pull chain, as illustrated in FIG. **6**. At the same time, movable locking member **50** is disengaged to free the chain from the pull frame. It will be appreciated, that any tension on the pull chain due to the resiliency of the vehicle body or frame will be maintained by locking member **52**. With the stationary locking member **52** in position, the pull frame is returned to its original extended position, as indicated in dash line in FIG. **6**. With the pull frame returned to the extended position, the movable locking member **52** is again placed in retentive engagement with pull chain **24** and stationary locking member **52** is removed.

By utilizing the pull tower in accordance with the above described procedure, the straightening assembly may be most expeditiously operated while maintaining a relatively constant tension on the pull chain. If the pull chain were freed for the return reciprocation of the pull frame, the vehicle body or frame would tend to spring back or partially return to its damaged configuration. This condition, of course, would necessitate several additional time-consuming reciprocations of the pull frame in order to straighten the body or frame to the desired configuration. Of course, it should be noted that it is not intended that the pull tower of the present invention be limited to the locking members illustrated in the drawings or to the use of a link chain for the purposes of pulling. If desired, the pull tower may be modified to provide other appropriate locking means such as clamps or bolts suitable for retentively grasping the pull chain, cable, or other elongated flexible member. Furthermore, it is not intended that the invention be limited to the use of a hydraulic ram, such as that illustrated in the drawings. It is foreseeable that other conventional motive means may be utilized for effecting movement of the pull frame relative to the stationary support framework.

With reference to FIG. **7**, it will be observed that the mounting collar **34** is provided with a pair of outwardly extending, oppositely disposed flange portions **64** and **66** which engage the lower edges of pull frame **46**. This arrangement provides a sliding mounting for the pull frame, thereby permitting easy reciprocation under the influence of hydraulic ram **48**. It will also be appreciated that the mounting collar together with the pull frame may be easily raised to a desired position, such as that indicated in dash by operation of crank handle **42** and ratchet mechanism **40**.

FIGS. **8** and **9** illustrate two preferred embodiments of stationary chain anchors to be utilized with the straightening assembly of the present invention. The embodiment of FIG. **8** is comprised of a relatively flat plate **68**, of steel or similar materials and provided with a mounting flange **70** at one lower corner and a chain receiving aperture **72** coextensive with a locking slot **74** of reduced dimension. The mounting flange cooperates with a corresponding flange on the anchor track **12**, whereby it may be easily mounted and dismounted at desired locations around the anchor track. The corresponding anchor chain is fed through aperture **72**, until snug, and the appropriate chain link is placed in retentive engagement with a slot **74**.

The anchor member **76** illustrated in FIG. **9** is also provided with a mounting flange indicated at **78** and a chain receiving aperture **80** coextensive with a slot **82**. Preferably, the anchor of FIG. **9** is utilized when the anchor chain is fastened to a relatively low vehicle frame portion while the anchor of FIG. **8** is utilized at higher levels.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A device for straightening vehicle frames, bdies, and the like, said device comprising, in combination:

a. a stationary rigid framework, said stationary framework including a base, a rigid vertical support column rigidly connected to said base and arranged for preventing pivoting with respect thereto, and a collar slidably mounted around said support column for selective vertical adjustment relative thereto, wheel means rotatably mounted on the colunn for facilitating movement thereof, the base provided with means for selectively rigidly mounting the framework on a continuous anchor track, the base extending toward a vehicle frame to be straightened and away from the wheel means, column, and anchor track, and engaging a support surface when the base is mounted on the anchor track;

b. an elonated, flexible member attachable to a vehicle;

c. pull means reciprocally mounted to said stationary framework for pulling the elongated, flexible member by movement between an extended position and a retracted position;

d. motive means for selectively moving said pull means relative to said stationary framework between said extended and retracted positions, said pull means being slidably mounted to said collar for generally horizontal movement relative thereto under the influence of said motive means; and

e. selectively releasable lock means carried by said pull means for retentively grasping the elongated flexible member when said pull means moves from said extended position toward said retracted position.

2. The structure set forth in claim **1,** wherein the framework further includes a ratchet mechanism mounted on the column and collar and arranged for selectively vertically adjusting the collar.

3. The structure set forth in claim **1** wherein said lock means includes first and second releasable lock means associated with a stationary anchor point for retentively grasping the elongated flexible member to maintain the tension thereon as said pull means is returned to said extended position, and is attached to one end portion of said horizontal frame, said motive means being at the opposite end of said horizontal frame.

4. The structure set forth in claim **3** wherein said pull means includes an elongated horizontal frame slidably mounted on said collar.

5. The structure set forth in claim **4** wherein said motive means extends between said horizontal frame and said support framework for imparting movement therebetween.

6. The structure set forth in claim **3** wherein said device includes a guide member attached to said collar for guiding the elongated flexible member toward said second lock means.

7. The structure set forth in claim **3** wherein said second lock means is attached to said vertical support column.

8. The structure set forth in claim **4** wherein said first lock means includes an aperture in said one end of said horizontal frame for receiving the elongated flexible member.

9. A vehicle body and frame straightening assembly comprising, in combination:

a. a continuous stationary anchor track arrangeable surrounding a vehicle to be repaired;

b. at least one stationary anchor member selectively fastened to said anchor track at a preselected location thereon and adapted to be fastened to a vehicle being repaired;

c. a pulling device selectively fastened to said anchor track opposite of said anchor member, and an elongated flexible member connected at one portion thereof to said pulling device and adapted to be attached to another portion thereof to the vehicle being repaired, said pulling device including a base, a stationary rigid framework having a rigid vertical support column rigidly connected to said base and arranged for preventing pivoting with respect thereto and a collar slidably mounted around said support column for selective vertical adjustment relative thereto, wheel means rotatably mounted on the column for facilitating movement thereof, the base provided with means for selectively rigidly mounting the framework on the anchor track, the base extending toward the vehicle being repaired and away from the wheel means, column, and track and engaging a support surface when the base is mounted on the anchor track, pull means reciprocally mounted on said stationary framework for pulling the elongated, flexible member attached to the vehicle by movement between an extended position and a retrated position, motive means for selectively moving said pull means relative to said stationary framework between said extended and retracted positions, said pull means being slidably mounted to said collar for generally horizontal movement relative thereto under the influence of said motive means, and locking means associated with said pull means and movable therewith for retentively grasping the elongated, flexible member when said pull means moves toward said retracted position.

10. The structure set forth in claim **9,** wherein the framework further includes a ratchet mechanism mounted on the column and collar and arranged for selectively vertically adjusting the collar.

11. The structure set forth in claim **9** wherein said lock means includes first and second releasable lock means associated with a stationary anchor point for retentively grasping the elongated flexible member to maintain the tension thereon as said pull means is returned to said extended position, and is attached to said horizontal frame, said motive means including a hydraulic ram attached to said horizontal frame and movable relative to said stationary framework.

12. The structure set forth in claim **11** wherein said pull means includes an elongated horizontal frame slidably mounted on said collar.

13. The structure set forth in claim **12** wherein said motive means extends between said horizontal frame and said collar for imparting movement therebetween.

14. The structure set forth in claim **11** wherein said device includes a guide member attached to said collar for guiding the elongated, flexible member toward said second fastening means.

15. The structure set forth in claim **11** wherein said second fastening means is attached to said vertical support column.

16. The structure set forth in claim **12** wherein said first fastening means includes an aperture in one end of said horizontal frame for receiving the elongated, flexible member.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,796,084 Dated March 12, 1974

Inventor(s) Davis R. Jarman

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 3, line 32, delete "34" insert -- 24 --; line 50, delete "52" insert -- 50 --;

Column 4, line 19, after "dash" insert -- lines --; line 51, delete "bdies" insert -- bodies --;

Column 5, line 22, delete "1" insert -- 4 --; line 30, delete "3" insert -- 1 --; line 44, delete "4" insert -- 3 --;

Column 6, line 18, delete "retrated" insert -- retracted --; line 33, delete "9" insert -- 12 --; line 34, delete "lock" insert -- locking --; line 42, delete "11" insert -- 9 --; line 52, delete "fastening" insert -- lock --; line 54, delete "fastening" insert -- lock --; line 56, delete "12" insert -- 11 --; line 57, delete "fastening" insert -- lock --.

Signed and sealed this 20th day of August 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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